XTS Introspect 5.0

Simplified Configuration and Usage Reporting for the Planning, Management and Auditing of Citrix XenApp Environments

Get the Insight you Need to Optimize Your Citrix Investment

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Executive Summary

I have been following XTS for a few years now and felt it was time to revisit their product because they recently released XTS Introspect, the next generation of their award-winning management analytics solution for Citrix. After playing with Introspect in my Presentation Server (sorry, I mean XenApp) lab, I see the engineers at XTS have been busy.

For those of you taking your first peek at Introspect, a little history is in order. The prior releases provided a very powerful, yet simple, user interface for slicing and dicing usage metrics. The resulting information provided the insight needed to ease the planning, managing and auditing of Citrix farms. With Introspect, XTS now introduces configuration reporting with a similar user interface that makes it very straight forward to produce advanced configuration reports.

Introspect historical usage reports are the perfect complement to real-time monitoring products like Citrix EdgeSight (now rebranded by Citrix as Application Performance & Monitoring for XenApp – I'll stick with the EdgeSight name for simplicity). While monitoring tools like EdgeSight do a great job providing real-time alerts, root cause analysis for troubleshooting and improving end-user experience, the historical analysis provided by Introspect can be used for capacity planning, license analysis, chargeback (billing for usage), security audits and documentation of Citrix environments. Plus, now you have the bonus of configuration property and policy reports in Introspect.

In this paper, I'm going to look at the major challenges that are faced by those of us responsible for the overall health and reliability of Citrix farms and why I think Introspect should be a key component of your systems management arsenal for overcoming these challenges. In addition, I'll review some of the new features available in Introspect 5.0, which is now available in three editions.

Challenges Faced by Citrix Professionals

Here are some specific challenges that I have come across over the years that can be addressed with Introspect.

Licensing Analysis – Containing license costs is always at the top of the list concerning any IT manager, and for that matter folks at the C-level as well. Accurately tracking usage of applications and processes within Citrix can be challenging. Even if you just want to retire a troublesome application, it can be difficult to gauge usage trends over long time periods to show the drop off of concurrent usage to make your case.

Billing / Chargeback – I know that many of you have complained that the chargeback mechanisms available for Citrix today are not sufficient, especially for complex organizations. Sometimes one group wants to be charged by concurrent usage and another requires chargeback by CPU on one application and all others by session duration. Today this requires a lot of custom coding.

Audits – How can you be sure that your access policies are being enforced for security, compliance or governance? The ability to run a monthly or even annual application configuration and usage audit can be critical to any organization. To be able to run this by security group or client IP address can be even more important. And if a former employee sues your company, you need to quickly produce reports regarding that user's activities down to the minute.

Capacity Planning – This is a never ending process, so the easier it is to understand the capacity related dynamics of your farm, the better. With Citrix, you especially want to keep tabs on your server resource consumption to head off problems before they occur due to lack of capacity, such as an overburdened server. Whether you are using physical or virtual servers, underutilization is also a waste of resources. From my experiences, I've seen a tremendous amount of underutilized Citrix servers, as well as some engineers caught off guard when capacity was exceeded.

Documentation – After a Citrix implementation or an upgrade, it can be a very manually intensive process to document all the configurations for the farm. There has not been a cost effective way to auto-document all or selected properties, permissions and policies for servers, applications and users/user groups.

Migration Management – Whether you are migrating from physical to virtual servers or upgrading your farms to the latest Citrix version, it has always been challenging to ensure the configurations were accurately converted. Many an eye-strain has occurred for engineers trying to eyeball screen shots or printed reports to compare configuration settings from the old environment to the new one.

Introspect to the Rescue

After installing Introspect in my farm, it was quickly apparent that it was going to be easy to use and the benefits were even clearer. I installed Platinum Edition that has both usage and configuration reporting. I'll get into all the editions in the next section.

What I found is that Introspect is engineered to give you the following benefits that address the problems I identified earlier:

1. License Analysis – Analyze peak usage and unique user information to gain accurate user counts down to the minute or at an aggregate level. Review Bottom X reports over any time period to identify applications that are not being

used and potentially retire them.   (e.g. Bottom 10 launched applications for last year.)

2. Billing – Create chargeback reports by security group based on any system metric collected by Citrix.
3. Audits – Easily determine which applications are distributed to which servers, which users or user groups have access and how applications and servers are being actually utilized by users or user groups.
4. Capacity Planning – Review farm (or farm subset) dynamics on one consolidated report that presents growth trends of total servers, applications, sessions, unique users, CPU, memory, etc. Multiple charts can be configured per page to visually display trends in context.   You can also create more detailed trending reports such as Top 10 Servers over any time period.
5. Documentation – Capture baseline configurations for audit and compliance reviews. Also useful to compare then and now properties when problems arise to see what has changed in the environment.
6. Migration Management – Not only can you document Citrix configurations to create baselines before migrations, but you can also run a comparison report between the old settings and new settings that clearly highlight the differences.

Introspect achieves the above benefits via the following features:

- Point-and-click user interface that enables detailed analysis.
- Reporting templates that can be shared with other Introspect users.
- Automated scheduling and email distribution profiles for report routing.
- Integrated with Active Directory for user, group or OU reporting.
- Ability to create custom reporting groups of servers, applications, etc.
- Export reports to PDF, Excel, HTML, Crystal, RTF and XML.
- Charts and graphs to analyze trends using thresholds and multi-field graphing.
- Built in formulas to calculate different size units of measure. For example, convert MB to GB, Minutes to Hours. Create custom formulas, such as dividing average memory by average duration for better understanding capacity.
- Customize look and feel of reports to present information in an aesthetically pleasing format.
- Use advanced filters and sorting to review Top X or Bottom X, days of the week, and Boolean algorithms. For example, I was able to run a report showing the five least used applications, only on weekdays with more than 100 sessions.

How It All Works

Introspect 5.0 is available in three editions – Standard, Enterprise and Platinum. Here is a quick synopsis of each.

Standard Edition – Basic configuration and policy reporting. No more MFCOM scripts! This is the only edition that can be purchased on their web site with a credit card.
Enterprise Edition – Advanced configuration reporting including integration with Active Directory, scheduling and email distribution. This also has the very useful comparison reports.
Platinum Edition – All of the configuration reporting features plus the historical usage reports.

The configuration reports that are included in all editions are a snap. I had them setup and running in minutes. The usage reports are a bit more involved, but it's worth the effort. The folks at XTS have taken a very unique approach for the usage reporting, using an analytics engine that auto-builds a multidimensional analysis database. At the core of this architecture is Microsoft Analysis Services, which comes with SQL Server 2000/2005 Standard or Enterprise licenses. XTS refers to this as the "Analysis Database."

As a result of having this Analysis Database, XTS has done something that is actually common in other enterprise platforms – creating a separate database for reporting and analysis that doesn't impact the production environment.

Those of you with large environments probably purge your Summary Database every month or so. One of the coolest features of Introspect is that the incremental updates of the Analysis Database allow you to still archive and purge the Summary Database. This will keep your Summary Database at a reasonable size on your Citrix production server, while the Analysis Database is available for unlimited historical reporting.

In some cases, it makes sense to install Introspect's Analysis Database on the same server as your Summary Database. It just depends on your failover, backup, and performance requirements. The nice thing is you have a choice.

Let me re-emphasize that Introspect usage reports do not compete directly with real-time / end-point monitoring products. The focus here is on historical data mining for trend analysis that requires **no data collection agents or coding**.

Introspect accomplishes this through their simple but extendable architecture that consists of the Introspect Service, Introspect Management Console (IMC) and the Introspect Analysis Database. These components may be installed in a single-server or in a multi-server environment.   The IMC is also a Microsoft MMC snap-in that can be published on a Citrix server for remote console access.

The following diagram was provided to me by the vendor and shows an overview of the current Introspect architecture for Platinum Edition:
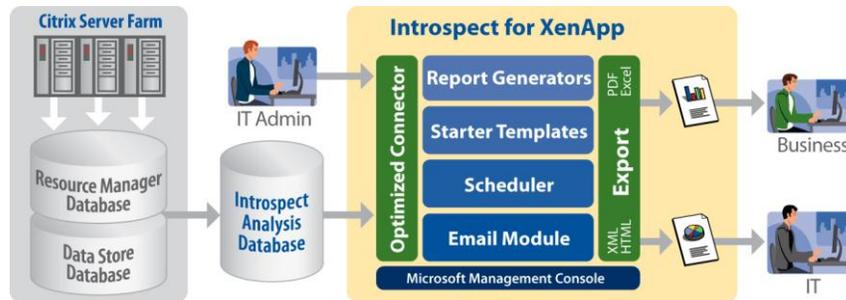
I did the data sync ad-hoc, but I can see most people putting this on a nightly schedule to keep all data in sync. It is that simple to set up. So far no coding or consultants required!

I quickly generated my first report using one of the many starter templates XTS provides. These templates are easy to modify or it's possible to start from scratch using one of the Introspect report generators.

The following screen shot is a view of Introspect's Session List Report Generator, one of many report generators available in Introspect. The report generators enable the slicing and dicing of servers, applications, processes, IP addresses, and users over selected time periods. There are the standard Citrix metric fields available such as CPU, Memory, Sessions, etc. as well as Introspect calculated fields that show averages and percentages. For example, the screen shot below shows a report generator used to evaluate Top 10 applications memory consumption as a percentage across all servers.
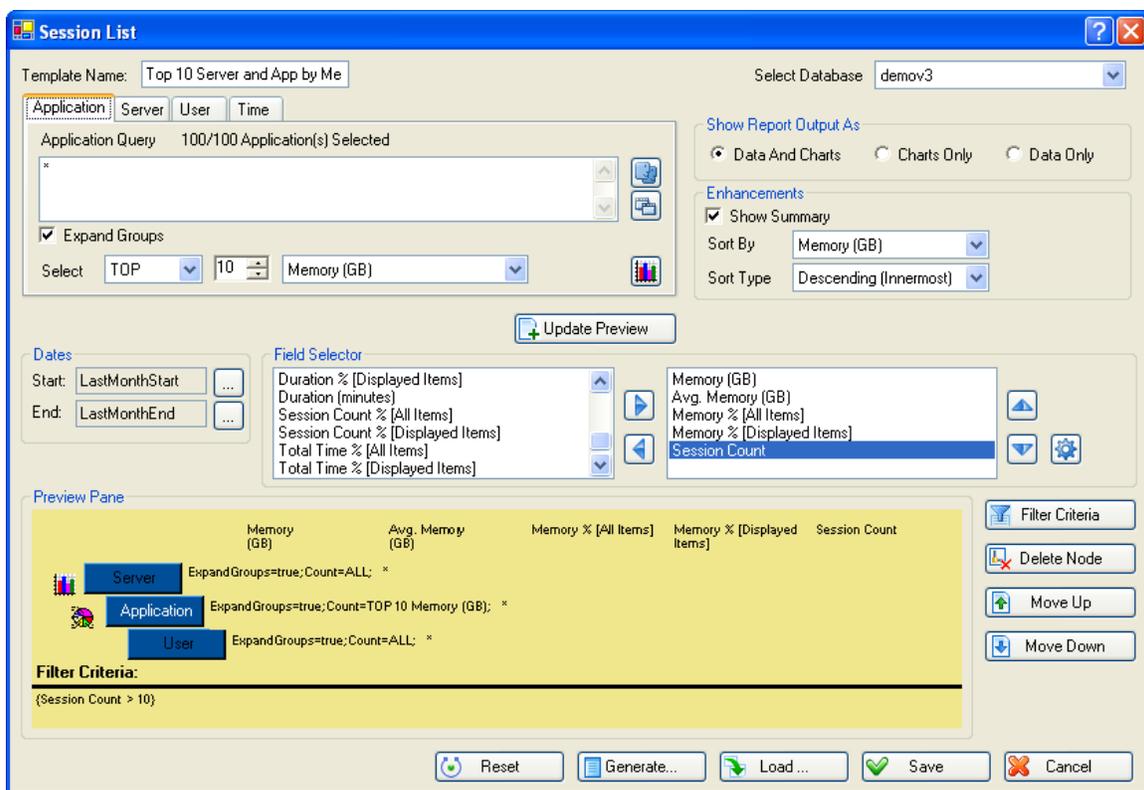
With Introspect Platinum Edition You can generate an exponential number of usage reports with the different report options.

- **Concurrency:** Peak usage analysis for capacity planning, license utilization and charge backs. This is my favorite option because so much can be learned from peak usage analysis. Analysis by server, application and user over any time period allows you to evaluate historical load trends from many different angles.
- **Session:** Published applications analysis by server, user or IP address for establishing baselines for planning. This information can be useful for capacity planning and various types of usage analysis.
- **Process:** Executable performance metrics and asset management. I can see this being used by those of you that publish desktops.
- **Aggregator:** Farm summary dashboard-style reports for monitoring historical farm growth. I'm betting managers will love the way this information is presented with multiple charts and graphs per page. Makes contextual analysis easier, such as comparing CPU and Memory consumption to number of published application, servers and unique users.
- **Time Detail:** Usage audits down to the minute. Also shows metrics like average session times and max session times.

In all the Introspect editions you can run configuration reports. This is where all the new features are in the Introspect 5.0 release. I have never seen an easier more flexible way to create Citrix configuration reports. One new feature that is in all

editions is the archival of configuration snapshots. Basically, you can set Introspect up to take daily archives of that day's settings and then you can run reports against any prior day's configuration snapshot.

Here are the various report generators you can run to generate configuration reports. Any of this data can be filtered to only return the information you want to review or save.

In Standard Edition:

- **Configuration List/Matrix:** Categories and properties for applications, servers, and user permissions. The list reports pretty much dumps the data. The matrix reports showed which applications were published on what servers or what users have access to what applications. Perfect for documenting environments for audits, setting baselines and troubleshooting configuration issues.
- **Configuration Farm Policy:** Farm policies by server, application, user, client IP and client name. Useful if you have implemented Citrix policies for documentation and troubleshooting.

In Enterprise Edition (including all Standard Edition report generators):

- **Configuration Property Matrix:** Server and application properties in an easy to read matrix format. This would be most useful in quickly eye-balling where there may be unexpected differences between server or application settings. And of course, good for keeping documentation.
- **Configuration Difference:** By far my favorite new feature! Allows comparison of configuration or policy settings where you can filter results by changed, deleted, or added settings. You can either save a report for comparison in the future or you can use archives to compare historical snapshots. There are three different ways that I can think of where this will make a Citrix engineer's job much easier.
  - Compare between historical snapshots for troubleshooting and audits
  - Compare servers, application, etc. settings in same farm to make sure properties are set to standards
  - Compare farms prior to and after migration projects

Here are a couple examples. The first is a configuration matrix report showing which applications are assigned to which servers.

	XTS04	XTS05	XTS06	XTS07	XTS08	Total Servers
TS05 Legacy Apps		●				1
TS06 Legacy Apps			●			1
TS07 Legacy Apps				●		1
TS08 Legacy Apps					●	1
Windows Explorer with T21	●	●	●	●	●	5
Word with Time21	●	●	●	●	●	5
Total Applications	22	24	22	22	24	

The second is a screen shot of a configuration comparison report, showing the differences between two servers in the same farm.
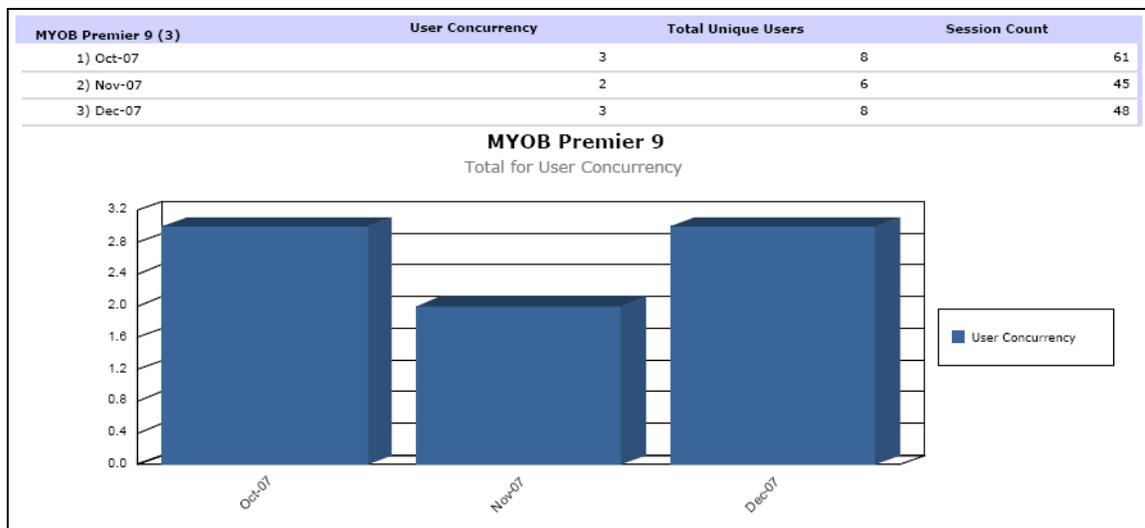
#	Field Name	FirstFileValue	SecondFileValue
1	Server Name	XTS4515	XTS4531
2	Server Enable ICA Keep-Alive	FALSE	TRUE
3	Server Timeout value (seconds)	30	30
4	Server Use farm settings for ICA Keep-Alive	TRUE	TRUE
5	Server Client printer bandwidth available	-1	-1
6	Server Auto Client Reconnect - log automatic reconnection attempts	TRUE	FALSE
7	Server Auto Client Reconnect - require user authentication	TRUE	TRUE
8	Server Auto Client Reconnect - Use farm settings	TRUE	TRUE
9	Server ICA Display - alternate caching method	TRUE	TRUE
10	Server ICA Display - Degradation bias	Bias to Resolution	Bias to Color Depth
11	Server ICA Display - discard redundant graphics operations	TRUE	TRUE
12	Server ICA Display - maximum memory to use for each session's graphics	8388608	5760000
13	Server ICA Display - Notify user of session degradation	FALSE	FALSE
14	Server ICA Display - use farm settings	FALSE	TRUE

So what else is there? How about out-of-the-box integration with Microsoft Active Directory? Introspect allows you easy access to AD users, groups and OU's. I know Introspect has been implemented at customer sites with more than 100k+ Active Directory users. I'm aware of at least one customer that uses Introspect's custom formula feature and creates a billing report tied to AD groups. I don't know of any other way to create billing reports like this, let alone this easily.
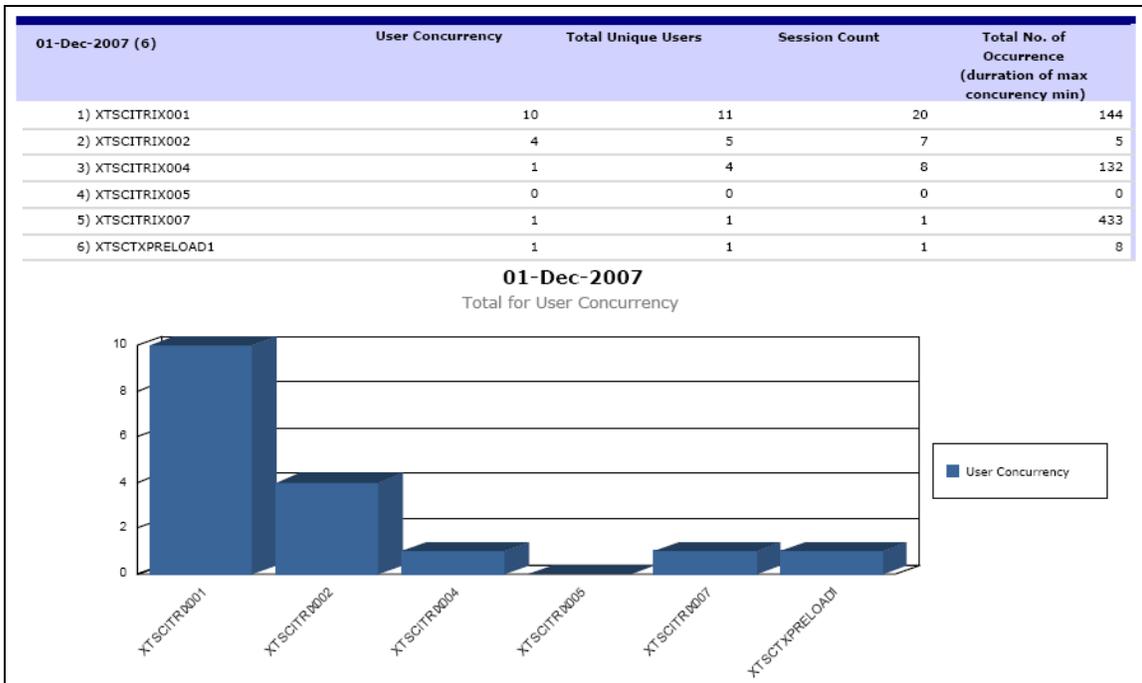
Let's take a look at usage reports available in Introspect Platinum Edition. The next screen shot is a monthly usage audit report filtered by the top 10 users by session count. Introspect calculates many fields for percentages, averages and maximums. For example, the Session Count % in this report shows what percentage of sessions they launched in comparison to all users.

XTS Citrix Management Reports

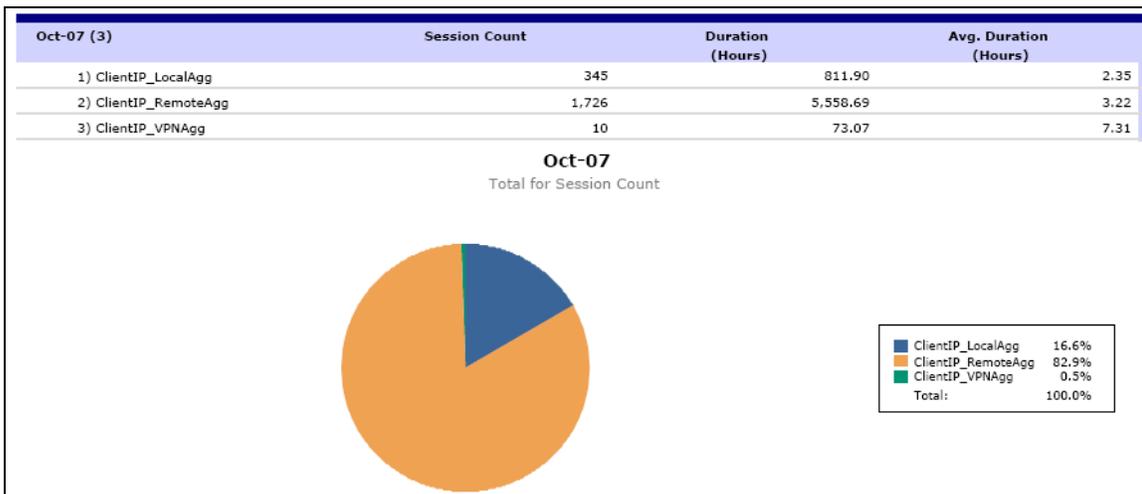|	Session Count	Session Count % [All Items]	Avg. Duration (minutes)	Avg. Active Time (minutes)
January-2006 (10.00)				
1) DCSCANLONJ	195	12.88	77.41	25.91
2) MELANIE	139	9.18	135.34	43.58
3) SCANLONJ	131	8.65	184.52	34.38
4) ELLA	126	8.32	97.51	57.72
5) MWILLICH	111	7.33	241.58	84.21
6) FORBESS	107	7.07	501.58	73.16
7) STEPHENG	96	6.34	252.20	133.93
8) TRAVISM	68	4.49	17.05	6.46
9) KIMB	62	4.10	131.50	38.74
10) PDUFFICY	61	4.03	122.18	68.60
Sum of January-2006	1,096.00	72.39		
Avg of January-2006	109.60	7.24		
February-2006 (10.00)				
1) MELANIE	168	9.39	154.98	95.03
2) RNT-IT	148	8.27	8.54	4.03
3) STEPHENG	138	7.71	187.19	72.70
4) SBADMIN2	122	6.82	106.85	51.59
5) ELLA	116	6.48	107.69	79.71
6) TRAVISM	107	5.98	44.48	18.99
7) SCANLONJ	106	5.92	136.39	32.25
8) DCSCANLONJ	104	5.81	116.16	21.24
9) FORBESS	84	4.69	700.64	129.26
10) SARA	80	4.47	143.93	55.45
Sum of February-2006	1,173.00	65.54		
Avg of February-2006	117.30	6.55		

Of course, reports would be nothing but a bunch of numbers without charts and graphs to visually show trends. The following screen shot shows peak usage by month for an application for licensing analysis using a bar chart. (There are 5 chart types to choose from.)

| MYOB Premier 9 (3)	User Concurrency	Total Unique Users	Session Count
1) Oct-07	3	8	61
2) Nov-07	2	6	45
3) Dec-07	3	8	48

MYOB Premier 9
Total for User Concurrency

Or show peak usage by server for a month for capacity planning. The last column is really cool because it shows total peak minutes for a server during the month.

01-Dec-2007 (6)	User Concurrency	Total Unique Users	Session Count	Total No. of Occurrence (durration of max concurency min)
1) XTSCITRIX001	10	11	20	144
2) XTSCITRIX002	4	5	7	5
3) XTSCITRIX004	1	4	8	132
4) XTSCITRIX005	0	0	0	0
5) XTSCITRIX007	1	1	1	433
6) XTSCTXPRELOAD1	1	1	1	8

01-Dec-2007
Total for User Concurrency

You can also create groups of IP ranges to see where users are coming from.

Oct-07 (3)	Session Count	Duration (Hours)	Avg. Duration (Hours)
1) ClientIP_LocalAgg	345	811.90	2.35
2) ClientIP_RemoteAgg	1,726	5,558.69	3.22
3) ClientIP_VPNAgg	10	73.07	7.31

Oct-07
Total for Session Count

ClientIP_LocalAgg	16.6%
ClientIP_RemoteAgg	82.9%
ClientIP_VPNAgg	0.5%
Total:	100.0%

To make your case for more resources based on farm growth, create graphs to see trends of applications, servers and users.
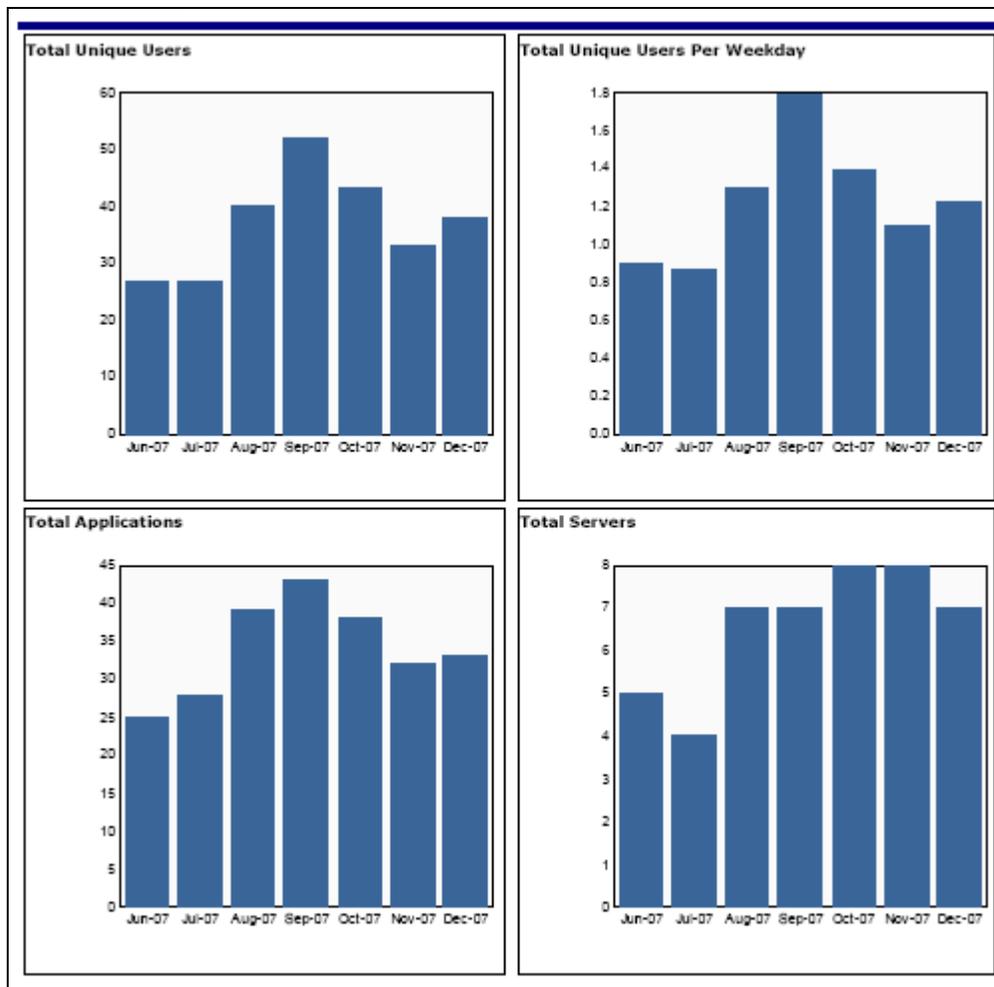
I found creating templates and automating report delivery was a piece of cake. You can schedule templates to run periodically and deliver reports in many formats like PDF or Excel via email or publish them in HTML to a portal. It is just that simple and still, not a line of code in sight!

Summary

To summarize, Citrix servers need to be closely managed; this we all agree upon. Now we need to define the methods and tools that we will need to achieve better planning, management, and overall farm documentation. Introspect provides a cost-effective, enterprise class solution that is long overdue for Citrix customers looking to get the maximum value from historical metrics and configurations. It allows you to easily create custom reports for any size environment using a scalable and flexible analytics engine. This is a powerful product and even a bit addictive. But most of all, it is useful and will make your job as a Citrix engineer much, much easier.

Additional Resources

This white paper represents my opinion, so I encourage you to evaluate this product using your own criteria. Go ahead and kick the tires on Introspect and see the value for yourself.

Click on the following link to download a [trial of Introspect Platinum Edition](#).

About the Author

Douglas A. Brown (DABCC, Inc.)
DABCC specializes in the design and development of techniques, methodologies, authoring, education, training, outsourcing and software products that add immediate value to server-based computing and on-demand virtual application computing world. The company was formed in 2004 to reduce complexity in corporate computing by developing and teaching a proven methodology for providing seamless, real-time access to strategic company information.

Douglas Brown worked at Citrix Systems, Inc. as a Senior Systems Engineer from 2001 to 2004 in which time he was voted Systems Engineer of the Year 2002 by his peers and management at Citrix. He was awarded the Microsoft MVP (Most Valuable Professional) by Microsoft Corporation in 2005 and 2006 for his contributions to the industry. He was also a charter award winner on the Citrix Technology Professional (CTP) program for his continued support of the Citrix community.   Mr. Brown has earned worldwide recognition for his dedication to providing server-based computing professionals with proven solutions for implementation, infrastructure design, time-saving utilities, performance tips and best practices. DABCC.com is one of the most frequently visited sites internationally for server-based computing information and networking opportunities.